

IN THE DRAWINGS:

The attached sheet of drawings includes changes to Fig. 7. This sheet, which includes Fig. 7, replaces the original sheet including Fig. 7. In Figure 7, Reference numeral 13 and corresponding lead line has been added.

Attachment: Replacement Sheet
Annotated Sheet Showing Changes

REMARKS

This is intended as a full and complete response to the Office Action dated November 25, 2008, having a shortened statutory period for response set to expire on February 25, 2009. Please reconsider the claims pending in the application for reasons discussed below.

In the specification, the sentences beginning on page 8, line 9 and on page 12, line 23 have been amended to correct minor editorial problems. In amended Figure 7, the previously omitted element numeral 13 has been added.

Claims 1-21 remain pending in the application and are shown above. Claims 1-21 are rejected. Claim 6 has been canceled. Claims 1, 14, 18, and 19 have been amended to further clarify the invention. New claims 22-24 have been added. Reconsideration of the rejected claims is requested for reasons presented below.

Drawings

The drawings are objected to as failing to comply with 37 C.F.R. § 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: Figure 7, part 14. Corrected drawing sheets in compliance with 37 C.F.R. 1.121(d) have been provided to include reference numeral 13.

Regarding the objection, the applicants respectfully disagree. Reference numeral 14 and corresponding terms are described in the specification on page 7, line 22. The Applicants respectfully request withdrawal of the objection to the drawings as failing to comply with 37 C.F.R. § 1.84(p)(5).

Specification

The disclosure is objected to because of the following informalities:

Page 8, line 9 – “regionss” should be spelled “regions”.

Page 12, line 23 – “charge” should be “charged”.

Appropriate amendments to the specification have been included with this response. The Applicants respectfully request withdrawal of the objection to the specification.

Claim Rejections Under 35 U.S.C. § 112

The term “residual gas diffusion barrier” in claims 1-18 is stated to be a relative term which renders the claim indefinite.

Applicants submit that a person having ordinary skill in the art would be reasonably apprised of the scope of the term based on the specification. The specification discloses that “a shower of residual gas” may result from electrons that impinge on component surfaces of the device, like extractors, anodes, apertures, or the chamber wall during operation of a charged particle beam device. (*Present Spec.*, p. 1, ll. 25-30.) Moreover, as the specification discloses, the residual gas may form ions, ionized molecules and other particles that can mechanically deform the emitter or be deposited on the emitter, thereby introducing emitter noise. (*Id.* p. 1, lines 30-p.2, lines 1-4.) The specification and drawings also describe the term “residual gas diffusion barrier” 106 and its relationship to other features of the charged particle beam device throughout the specification. (*Id.*, *passim.*) Thus, the specification adequately describes the terms “residual gas” and a “residual gas barrier” to a person having ordinary skill in the art. The applicants respectfully request withdrawal of the rejection of claims 1-18 under U.S.C. § 112.

Applicants have also added new claims 22-24 which further limit the term “residual gas diffusion barrier.”

Claim Rejections Under 35 U.S.C. § 102

Claims 1-4, 12, and 14-18 re rejected under 35 U.S.C. § 102(b) as being taught by *Tsutsumi, et al.* (USPN 4,889,995). Applicants respectfully traverse the rejection as hereinafter set forth.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Applicants respectfully assert that independent claims 1, 14, and 18 are not anticipated by *Tsutsumi* under 35 U.S.C. § 102(b) because *Tsutsumi* does not describe each and every element of independent claims 1, 14, and 18, as currently amended. In particular, *Tsutsumi* does not describe a gas diffusion barrier that is in beam direction directly subsequent to the emitter and acts as an electrode for extracting or modulating emitted charged particles, as recited in independent claims 1, 14, and 18.

Tsutsumi discloses an analysis apparatus which employs electrons and in which a rotary vacuum pump evacuates gas or air from a specimen exchange chamber. (*Tsutsumi*, Abstract.) According to Fig. 1, a scanning electron microscope 1 includes a microscope column 2 and a specimen chamber 3 formed below the microscope column 2. (*Tsutsumi*, col. 2, ll. 56-66). The microscope column 2 incorporates an electron gun 4 and an electron lens system which consists of a first condenser lens 5 and a second condenser lens 6 and an objective lens 7, as well as a deflection system of electron beam 8 for deflecting a focussed electron beam on a specimen during scanning operation. (*Id.*) According to the specification, the microscope column 2 is equipped with a main pumping system including three ultra-high vacuum pumps 12A to 12C. (*Tsutsumi*, col. 3, ll. 7-12.)

However, *Tsutsumi* does not disclose or suggest a residual gas diffusion barrier that is in beam direction directly subsequent to the emitter and that acts as an electrode for extracting or modulating emitted charged particles.

As *Tsutsumi* does not describe a residual gas diffusion barrier separating the first and the second UHV regions, wherein the residual gas diffusion barrier is in beam direction directly subsequent to the emitter and acts as an electrode for extracting or modulating emitted charged particles, as recited in independent claim 1, Applicants assert that claim 1 is not anticipated by *Tsutsumi* and respectfully request that the Examiner withdraw the rejection of independent claim 1 under 35 U.S.C. § 102(b).

As *Tsutsumi* does not describe a residual gas diffusion barrier in beam direction directly subsequent to the emitter, wherein the residual gas diffusion barrier separates

the charged particle emission component into a first and a second ultra-high vacuum (UHV) region, wherein the residual gas diffusion barrier acts as an electrode for extracting or modulating emitted charged particles, as recited in independent claim 14, Applicants assert that claim 14 is not anticipated by *Tsutsumi* and respectfully request that the Examiner withdraw the rejection of independent claim 14 under 35 U.S.C. § 102(b).

As *Tsutsumi* does not describe a residual gas diffusion barrier in beam direction directly subsequent to the emitter and separating the first and the second UHV regions, wherein the residual gas diffusion barrier acts as an electrode for extracting or modulating the emitted charged particles, as recited in independent claim 18, Applicants assert that claim 18 is not anticipated by *Tsutsumi* and respectfully request that the Examiner withdraw the rejection of independent claim 18 under 35 U.S.C. § 102(b).

Applicants additionally assert that each of dependent claims 2-4, 12, and 15-17 is allowable at least because each depends directly from either claim 1 or 14, which is allowable. Therefore, Applicants assert that claims 2-4, 12, and 15-17 are not anticipated by *Tsutsumi* and respectfully request that the Examiner withdraw the rejection of dependent claims 2-4, 12, and 15-17 under 35 U.S.C. § 102(b).

Claim Rejections Under 35 U.S.C. § 103

Claims 6, 10, 19, and 20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Tsutsumi, et al.* in view of *Knowles* (USPN 5,828,064). Claim 6 has been cancelled. Applicants respectfully traverse the rejection as hereinafter set forth.

To establish prima facie obviousness of a claimed invention, all of the claim limitations must be taught or suggested by the prior art. (*In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA)).

Claim 10

Claim 10 depends directly from claim 1, and includes the elements and limitations recited therein.

As previously discussed herein, the teachings of *Tsutsumi* does not describe, teach, or suggest a residual gas diffusion barrier that is in beam direction directly subsequent to the emitter and that acts as an electrode for extracting or modulating emitted charged particles

The teachings of *Knowles* do not satisfy the deficiencies of *Tsutsumi*. The Examiner asserts that *Knowles* teaches a guard ring against gas diffusion in a differential vacuum pumping apparatus also acts as an electrode for modulating emitted charged particles. (*Office Action* dated 11-25-2008, p. 5.) However, *Knowles* teaches that a guard ring 148 is placed outside of a detector ring 136 of an objective lens assembly 174 of an environmental electron scanning microscope. (*Knowles*, col. 11, line 46-col. 12, line 6, Figure 9.) Therefore, *Knowles* teaches that the guard ring 148 is an element of the objective lens assembly and positioned near the specimen, but not directly subsequent to the emitter.

Thus, combination of *Tsutsumi* and *Knowles* fails to teach, show, or suggest a residual gas diffusion barrier separating the first and the second UHV regions, wherein the residual gas diffusion barrier is in beam direction directly subsequent to the emitter and acts as an electrode for extracting or modulating emitted charged particles, as recited in independent claim 1 and claims dependent thereon.

As combination of *Tsutsumi* and *Knowles* fails to teach, show, or suggest each of the limitations of independent claim 1, the Applicants respectfully assert that dependent claim 10 would not have been obvious to one of ordinary skill in the art at the time the invention was made, and respectfully request that the Examiner withdraw the rejection of dependent claim 10 under 35 U.S.C. § 103(a).

Claims 19 and 20

Applicants respectfully assert that *Tsutsumi* and *Knowles*, when combined, do not describe, teach, or suggest a method of operating a charged particle beam device, wherein the charged particle beam device has a residual gas diffusion barrier that is in

beam direction directly subsequent to an emitter and acts as an electrode for extracting or modulating emitted charged particles, the method including emitting a charged particle beam such that a portion of the charged particle beam is essentially not blocked by the residual gas diffusion barrier within a first UHV region, as recited in independent claim 19 as currently amended, and these differences between claim 19 and the combined teachings of the cited references would not have been obvious to one of ordinary skill in the art at the time the invention was made.

The teachings of *Tsutsumi* and *Knowles* have been described above.

As *Tsutsumi* and *Knowles*, when combined, do not teach or suggest a method of operating a charged particle beam device, wherein the charged particle beam device has a residual gas diffusion barrier that is in beam direction directly subsequent to an emitter and acts as an electrode for extracting or modulating emitted charged particles, the method including emitting a charged particle beam such that a portion of the charged particle beam is essentially not blocked by the residual gas diffusion barrier within a first UHV region, as recited in independent claim 19 as currently amended, Applicants respectfully assert that independent claim 19 could not have been obvious to a person of ordinary skill in the art at the time the invention was made considering *Tsutsumi* in view of *Knowles*, and request that the Examiner withdraw the rejection of independent claim 19 under 35 U.S.C. § 103(a).

Furthermore, the nonobviousness of independent claim 19 precludes a rejection of claim 20, which depends therefrom, because a dependent claim is obvious only if the independent claim from which it depends is obvious. See *In re Fine*, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988), see also MPEP § 2143.03. Therefore, Applicants request that the Examiner withdraw the 35 U.S.C. § 103(a) obviousness rejection to claim 20, in addition to the rejection to independent claim 19.

Claims 5 and 21 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Tsutsumi, et al.* as applied to claim 1 above and *Tsutsumi, et al.* and *Knowles* as applied to claim 19 above, and further in view of *Ooaeh, et al.* (USPN 5,854,490).

The standards for determining whether a claim is obvious under 35 U.S.C. § 103(a) are discussed above in relation to the rejection of claims 6, 10, 19, and 20.

Claims 5 and 21 depend directly from claim 1 and 19 respectively, and include the elements and limitations recited therein.

As previously discussed herein, the teachings of *Tsutsumi* and *Knowles* do not describe, teach, or suggest charged particle beam device having a residual gas diffusion barrier that is in beam direction directly subsequent to an emitter and acts as an electrode for extracting or modulating emitted charged particles as recited in independent claims 1 and 19.

The teachings of *Ooaeh* do not satisfy the deficiencies of *Tsutsumi* and *Knowles*. *Ooaeh* teaches an electron gun for emitting an electron beam having a tip that is a substantially circular conic shape and a top surface substantially at the beam axis, multiple apertures between and/or apart of a cathode, anode, guide electrode, lens electrode, and forming a cross-over image of the electron beam. (*Ooaeh*, col. 8, lines 30-55.)

However, *Ooaeh* is silent regarding a charged particle beam device having a residual gas diffusion barrier that is in beam direction directly subsequent to an emitter and acts as an electrode for extracting or modulating emitted charged particles.

Thus, combination of *Tsutsumi*, *Knowles*, and *Ooaeh* fails to teach, show, or suggest a residual gas diffusion barrier separating the first and the second UHV regions, wherein the residual gas diffusion barrier is in beam direction directly subsequent to the emitter and acts as an electrode for extracting or modulating emitted charged particles, as recited in independent claim 1 and claims dependent thereon.

As combination of *Tsutsumi*, *Knowles*, and *Ooaeh* fails to teach, show, or suggest each of the limitations of independent claim 1, the Applicants respectfully assert that dependent claim 5 would not have been obvious to one of ordinary skill in the art at the

time the invention was made, and respectfully request that the Examiner withdraw the rejection of dependent claim 5 under 35 U.S.C. § 103(a).

Additionally, combination of *Tsutsumi*, *Knowles*, and *Ooaeh* fails to teach, show, or suggest a method of operating a charged particle beam device, wherein the charged particle beam device has a residual gas diffusion barrier that is in beam direction directly subsequent to an emitter and acts as an electrode for extracting or modulating emitted charged particles, the method including emitting a charged particle beam such that a portion of the charged particle beam is essentially not blocked by the residual gas diffusion barrier within a first UHV region, as recited in independent claim 19 as currently amended.

As combination of *Tsutsumi*, *Knowles*, and *Ooaeh* fails to teach, show, or suggest each of the limitations of independent claim 19, the Applicants respectfully assert that dependent claim 21 would not have been obvious to one of ordinary skill in the art at the time the invention was made, and respectfully request that the Examiner withdraw the rejection of dependent claim 21 under 35 U.S.C. § 103(a).

Claim 7 is rejected under 35 U.S.C. § 103(a) as being unpatentable over *Tsutsumi, et al.* as applied to claim 1 above and *Tsutsumi, et al.* and *Knowles* as applied to claim 19 above, and further in view of *Wieland, et al.* (USPAPN 2004/0141169) and in re *Aller*.

The standards for determining whether a claim is obvious under 35 U.S.C. § 103(a) are discussed above.

Claim 7 depends directly from claim 1, and includes the elements and limitations recited therein.

As previously discussed herein, the teachings of *Tsutsumi* and *Knowles* do not describe, teach, or suggest charged particle beam device having a residual gas diffusion barrier that is in beam direction directly subsequent to an emitter and acts as

an electrode for extracting or modulating emitted charged particles as recited in independent claims 1.

The teachings of *Wieland* do not satisfy the deficiencies of *Tsutsumi* and *Knowles*. *Wieland* teaches an electron beam exposure apparatus for transferring a pattern onto the surface of a target. (*Wieland*, paragraph [0015].)

However, *Wieland* is silent regarding a charged particle beam device having a residual gas diffusion barrier that is in beam direction directly subsequent to an emitter and acts as an electrode for extracting or modulating emitted charged particles.

Thus, combination of *Tsutsumi*, *Knowles*, and *Wieland* fails to teach, show, or suggest a residual gas diffusion barrier separating the first and the second UHV regions, wherein the residual gas diffusion barrier is in beam direction directly subsequent to the emitter and acts as an electrode for extracting or modulating emitted charged particles, as recited in independent claim 1 and claims dependent thereon.

As combination of *Tsutsumi*, *Knowles*, and *Wieland* fails to teach, show, or suggest each of the limitations of independent claim 1, the Applicants respectfully assert that dependent claim 7 would not have been obvious to one of ordinary skill in the art at the time the invention was made, and respectfully request that the Examiner withdraw the rejection of dependent claim 7 under 35 U.S.C. § 103(a).

Regarding dependent claim 7, Applicants additionally assert that the cited prior art references, when combined, do not teach or suggest at least one beam shaping element in the second UHV region, wherein the at least one beam shaping element blocks a portion of the charged particle beam by having an opening for the charged particle beam, the opening having a size corresponding to a beam emission angle less than 5°, as recited in dependent claim 7.

In particular, the Examiner asserts the Figure 7, part 48 teaches at least one beam shaping element in a second region wherein the at least one beam shaping

element blocks a portion of the charged particle beam by having an opening for the charged particle beam. (*Office Action* dated 11-25-2008, p. 8.)

However, Figure 7 does not teach the elements recited in claim 7. *Wieland* teaches that the beamlet position are measured and stored and then compared to the position the beamlet should have. (*Wieland*, paragraph [0116].) The difference in position is integrated in the pattern information and sent of the modulation means. (*Id.*) However, since changing the signal sequence takes a lot of time, the measured difference is integrated in the pattern information by transforming it into a corresponding difference in timing in the beamlet modulation, and Figure 7 explains how the adjustments are implemented. (*Id.* [0117].) No structure is even provided in Figure 7 to even suggest at least one beam shaping element in the second UHV region, let alone that the at least one beam shaping element blocks a portion of the charged particle beam by having an opening for the charged particle beam.

Therefore, Applicants respectfully assert that dependent claim 7 could not have been obvious to a person of ordinary skill in the art at the time the invention was made considering *Tsutsumi* and *Knowles* in view of *Wieland*, and request that the Examiner withdraw the rejection of dependent claim 7 under 35 U.S.C. § 103(a) for this additional reason.

Claims 8, 9, and 13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Tsutsumi, et al.* as applied to claim 1 above and further in view of *Ishida, et al.* (USPN 6,031,235).

The standards for determining whether a claim is obvious under 35 U.S.C. § 103(a) are discussed above.

Claims 8, 9, and 13 depend directly from claim 1, and includes the elements and limitations recited therein.

As previously discussed herein, the teachings of *Tsutsumi* do not describe, teach, or suggest charged particle beam device having a residual gas diffusion barrier

that is in beam direction directly subsequent to an emitter and acts as an electrode for extracting or modulating emitted charged particles as recited in independent claims 1.

The teachings of *Ishida* do not satisfy the deficiencies of *Tsutsumi*. *Ishida* teaches an ultra-high vacuum apparatus capable of shortening a baking time for outgassing treatment, where the vacuum has a vacuum container, a means for evacuating the vacuum container so as to maintain the inside as an ultra-high vacuum, and a valve means for connecting and disconnecting the inside of the vacuum container with and from the outside, where the valve includes a vacuum-tight seal made of a high molecular weight polymer. (*Ishida*, col. 2, ll. 18-37].)

However, *Ishida* is silent regarding a charged particle beam device having a residual gas diffusion barrier that is in beam direction directly subsequent to an emitter and acts as an electrode for extracting or modulating emitted charged particles.

Thus, combination of *Tsutsumi* and *Ishida* fails to teach, show, or suggest a residual gas diffusion barrier separating the first and the second UHV regions, wherein the residual gas diffusion barrier is in beam direction directly subsequent to the emitter and acts as an electrode for extracting or modulating emitted charged particles, as recited in independent claim 1 and claims dependent thereon.

As combination of *Tsutsumi* and *Ishida* fails to teach, show, or suggest each of the limitations of independent claim 1, the Applicants respectfully assert that dependent claims 8, 9, and 13 would not have been obvious to one of ordinary skill in the art at the time the invention was made, and respectfully request that the Examiner withdraw the rejection of dependent claims 8, 9, and 13 under 35 U.S.C. § 103(a).

Claim 11 is rejected under 35 U.S.C. § 103(a) as being unpatentable over *Tsutsumi, et al.* as applied to claim 1 above and further in view of *Wegman* (USPN 3,206,598).

The standards for determining whether a claim is obvious under 35 U.S.C. § 103(a) are discussed above.

Claim 11 depends directly from claim 1, and includes the elements and limitations recited therein.

As previously discussed herein, the teachings of *Tsutsumi* does not describe, teach, or suggest charged particle beam device having a residual gas diffusion barrier that is in beam direction directly subsequent to an emitter and acts as an electrode for extracting or modulating emitted charged particles as recited in independent claims 1.

The teachings of *Wegman* do not satisfy the deficiencies of *Tsutsumi*. *Wegman* teaches an electron diffraction apparatus where steps are taken gas reactions, particularly, oxidations, are entirely or at least largely avoided. (*Wegman*, col. 1, ll. 60-66.)

However, *Wegman* is silent regarding a charged particle beam device having a residual gas diffusion barrier that is in beam direction directly subsequent to an emitter and acts as an electrode for extracting or modulating emitted charged particles.

Thus, combination of *Tsutsumi* and *Wegman* fails to teach, show, or suggest a residual gas diffusion barrier separating the first and the second UHV regions, wherein the residual gas diffusion barrier is in beam direction directly subsequent to the emitter and acts as an electrode for extracting or modulating emitted charged particles, as recited in independent claim 1 and claims dependent thereon.

As combination of *Tsutsumi* and *Wegman* fails to teach, show, or suggest each of the limitations of independent claim 1, the Applicants respectfully assert that dependent claim 11 would not have been obvious to one of ordinary skill in the art at the time the invention was made, and respectfully request that the Examiner withdraw the rejection of dependent claim 11 under 35 U.S.C. § 103(a).


Conclusion

In conclusion, the references cited by the Examiner, alone or in combination, do not teach, show, or suggest the invention as claimed.

The secondary references made of record are noted. However, it is believed that the secondary references are no more pertinent to the Applicant's disclosure than the primary references cited in the office action. Therefore, Applicant believes that a detailed discussion of the secondary references is not necessary for a full and complete response to this office action.

Having addressed all issues set out in the office action, Applicant respectfully submits that the claims are in condition for allowance and respectfully requests that the claims be allowed.

Respectfully submitted,



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